

Voltage-gated sodium channels (Na_v) in GtoPdb v.2025.4

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Abstract

Sodium channels are voltage-gated sodium-selective ion channels present in the membrane of most excitable cells. Sodium channels comprise one pore-forming α subunit, which may be associated with either one or two β subunits [191]. α -Subunits consist of four homologous domains (I-IV), each containing six transmembrane segments (S1-S6) and a pore-forming loop. The positively charged fourth transmembrane segment (S4) acts as a voltage sensor and is involved in channel gating. The crystal structure of the bacterial NavAb channel has revealed a number of novel structural features compared to earlier potassium channel structures including a short selectivity filter with ion selectivity determined by interactions with glutamate side chains [298]. Interestingly, the pore region is penetrated by fatty acyl chains that extend into the central cavity which may allow the entry of small, hydrophobic pore-blocking drugs [298]. Auxiliary β 1, β 2, β 3 and β 4 subunits consist of a large extracellular N-terminal domain, a single transmembrane segment and a shorter cytoplasmic domain. Pharmacological targeting of voltage-gated sodium channels has long been a cornerstone of clinical treatment for a range of conditions. Classical sodium channel blockers, many of which act by occluding the central pore, are widely used as local anesthetics, antiarrhythmic agents, and anticonvulsants [135]. More recently, suzetrigine, a highly selective Na_v1.8 inhibitor, received FDA approval for the treatment of acute post-operative pain [202, 419].

The nomenclature for sodium channels was proposed by Goldin *et al.*, (2000) [155] and approved by the NC-IUPHAR Subcommittee on sodium channels (Catterall *et al.*, 2005, [54]).

Contents

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Database links

[Voltage-gated sodium channels \(Na_v\)](#)

<https://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=82>

[Introduction to Voltage-gated sodium channels \(Na_v\)](#)

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Channels and Subunits

Na_v1.1

<https://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=578>

Na_v1.2

<https://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=579>

Na_v1.3

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Na_v1.4

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Na_v1.5

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Na_v1.6

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Na_v1.8

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Na_v1.9

<https://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=586>

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